Alg. 2 Warm Up #5-1

Find the x- and y- intercepts for the parabolas:

1) $y = (x - 1)(x + 5)$

2) $y = x^2 + 8x + 7$

3) $y = (x + 5)^2$

4) $y = (x - 2)^2 - 9$

HW Questions:

2-17. If $p(x) = x^2 + 5x - 6$, find:

a. Where $p(x)$ intersects the y-axis.

b. Where $p(x)$ intersects the x-axis.

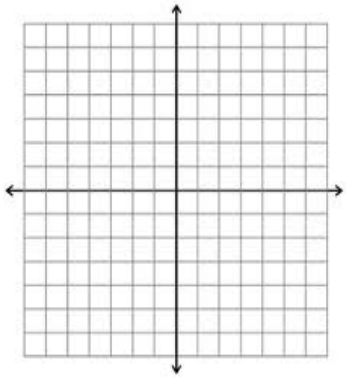
c. If $q(x) = x^2 + 5x$, find the intercepts of $q(x)$ and compare the graphs of $p(x)$ and $q(x)$.

d. Find $p(x) - q(x)$.

$x^2 + 5x - 6 - (x^2 + 5x)$

$x^2 + 5x - 6 - x^2 - 5x$

$= -6$



2-18. Solve for z in each equation below.

a. $4^z = 8$ → change both to base 2.

b. $4^{2z/3} = 8^{(z+2)}$

c. $3^z = 81^2$

change 81 to base 3

$3^z = (3^4)^2$

$3^z = 3^8$

$\boxed{z = 8}$

d. $5^{(z+1)/3} = 25^{1/z}$

change 25 to base 5

$5^{(z+1)/3} = (5^2)^{1/z}$

$\frac{z+1}{3} = \frac{2}{1} \cdot \frac{1}{z}$

$\frac{z+1}{3} = \frac{2}{z}$

cross multiply and solve.

2-19. Simplify each of the following expressions. Be sure that your answer has no negative or fractional exponents.

a. $\left(\frac{1}{81}\right)^{-1/4}$

Negative exponent, so do the reciprocal:

$(81)^{1/4}$

Now, the 4 in the denominator means 4th root:

$\sqrt[4]{81}$

$= 3$

b. $x^{-2}y^{-4}$

c. $(2x)^{-2}(16x^2y)^{1/2}$

first do the negative exp.

$\left(\frac{1}{2x}\right)^2 (16x^2y)^{1/2}$ ← square root

$\frac{1}{4x^2} \cdot \frac{\sqrt{16x^2y}}{1}$

$\frac{1}{4x^2} \cdot \frac{\sqrt{16}\sqrt{x^2}\sqrt{y}}{1}$

$\frac{4 \times \sqrt{y}}{4x^2}$

$\frac{x\sqrt{y}}{x \cdot x}$

2-20. Daniela, Kieu, and Duyen decide to go to the movies one hot summer afternoon. The theater is having a summer special called Three Go Free. They will get free movie tickets if they each buy a large popcorn and a large soft drink. They take the deal and spend $22.50 on food, drinks and movie tickets. The next week, they go back again, only this time, they each pay $8.00 for their ticket, they each get a large soft drink, but they share one large bucket of popcorn. This return trip costs them a total of $37.50.

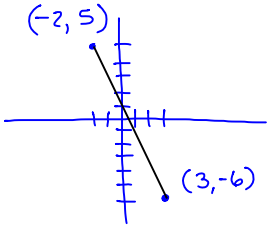
a. Find the price of a large soft drink and the price of a large bucket of popcorn.

b. Did you write two equations or did you use another method? If you used another method, write two equations now and solve them. If you already used a system of equations, skip this part.

2-21. Plot each pair of points and find the distance between them. Give answers in both square-root form and as decimal approximations.

(a.) (3,–6) and (–2,5) b. (5,–8) and (–3,1) c. (0, 5) and (5, 0)

d. Write the distance you found in part (c) in simplified square-root form.



$d = \sqrt{(\quad)^2 + (\quad)^2}$

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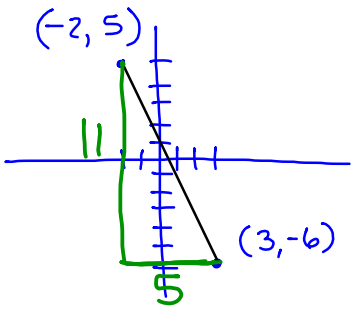


$d = \sqrt{(-2-3)^2 + (5+6)^2}$

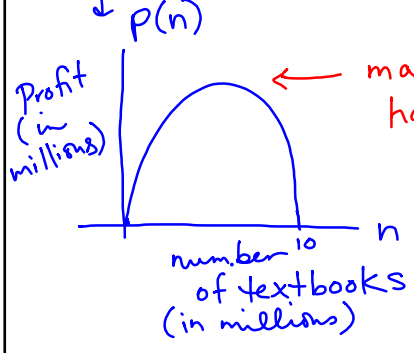
$d = \sqrt{(-5)^2 + (11)^2}$

$d = \sqrt{25+121}$

$d = \sqrt{146}$

2-22. The amount of profit (in millions) made by Scandal Math, a company that writes math problems based on tabloid articles, can be found by the equation $P(n) = -n^2 + 10n$, where n is the number of textbooks sold (also in millions). Find the maximum profit and the number of textbooks that Scandal Math must sell to realize this maximum profit.

n intercepts → $0 = -n(n-10)$, $n = 0, 10$



← maximum is at the vertex. halfway between the intercepts

$n = 5$

Summary: Transforming $y = x^2$

$y = ax^2$

a affects the width of the graph.

Compared to $y = x^2$

For $a > 1$, the graph is narrower. (vertical stretch)

For $0 < a < 1$, the graph is wider. (vertical compression)

On your own piece of graph paper:

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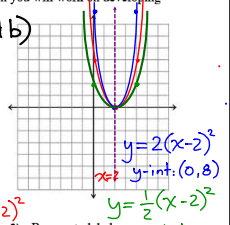
2.1.2 How can I shift a parabola?

Parabola Investigation

In Algebra 1 you learned about slope and y-intercept, ideas that allow you to write equations and sketch graphs of any line. During this lesson you will work on developing similar tools for parabolas.



2-11. PARABOLA LAB, Part One

What happens to a parabola's graph when you change the numbers in the equation? To get a better sense of the different ways to transform the graph of a parabola, as a team complete the investigation outlined below. As you work, be sure to sketch the graphs you see in your graphing calculator carefully and record the equations you enter.

a. On graph paper, graph the equation $y = (x - 2)(x - 2)$. Be sure to label any important points on your graph, including the lowest point on the graph, called the **vertex**. (If the graph were to open downward, the vertex would be the highest point on the graph.) Also sketch and write the equation of the line of symmetry of your graph. → $x = 2$

b. Use your graphing calculator to find the equations of two parabolas with *different* graphs that also open upward and still have a vertex at (2, 0). Add sketches of these two new graphs to your graph from part (a), along with their equations. As you work, keep track of any ideas you try along with their results, even if they do not answer this question, as they may help you later.

c. Use your graphing calculator to find the equations of two different parabolas that open *downward*, each with its vertex on the x-axis at $x = 2$. How did you change the equation so that the parabola would open downward? Add sketches of these graphs and their equations to your axes. What are their lines of symmetry?

Make "a" negative

d. Use your graphing calculator to find the equation of a parabola that opens downward with a vertex at (−4, 0). What is the equation of your parabola's line of symmetry? $x = -4$ $y = -(x+4)^2$

e. Choose a new point on the x-axis and find at least three equations of parabolas that touch the x-axis only at that one point.

Add today's classwork on the same piece of graph paper:

CP's: 2- 11, 13 and 14

2-13. p. 62 Graph the parabola $y = x^2$. Be sure to label any important points. When you are sure that your graph is complete and accurate, trace over it in colored pencil.

a. Find a way to change the equation is to make the $y = x^2$ parabola *stretch vertically*. That is, to make the graph look narrower, so the points in the parabola seem to rise away from the vertex more quickly. The new parabola should have the same vertex and orientation (i.e., open up) as $y = x^2$. Record the equations you try, along with their results. Write down the results even when they are wrong – they may come in handy later on.

b. Find a way to change the equation to make the $y = x^2$ parabola *compress vertically*. That is, to make the graph look flatter, so that the points seem to rise away from the vertex less quickly. Record the equations you try, along with their results and your observations.

c. Find a way to change the equation to make the same parabola *open downward*. The new parabola should be congruent (the same shape and size) to $y = x^2$, with the same vertex, except it should open downward so its vertex will be its highest point. Record the equations you try, their results, and your observations.

d. Find a way to change the equation to make the $y = x^2$ parabola *move 5 units down*. Your new parabola should look exactly like $y = x^2$, but the vertex should be at $(0,-5)$. Record the equations you try, along with their results. Include a comment about moving the graph up as well as down.

e. Find a way to change the equation to make the $y = x^2$ parabola *move 3 units to the right*. Your new parabola should look exactly like $y = x^2$, except that the vertex should be at the point $(3, 0)$. If you need an idea to get started, review your work on problem 2-11. Record the equations you try, along with their results. Include a comment about how to move the parabola to the left as well as how to move it to the right.

f. Find a way to change the equation to make the $y = x^2$ parabola *move 3 units to the left*, as in part (e), AND *stretch vertically*, as in part (a). Record the equations you try, along with their results.

Further Guidance section ends here.

2-14. Find a way to change the equation to make the $y = x^2$ parabola *vertically compressed, open down, move six units up, and move two units to the left*. Where is the vertex of your new parabola?

HW: 2-

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